YEARBOOK

OF THE

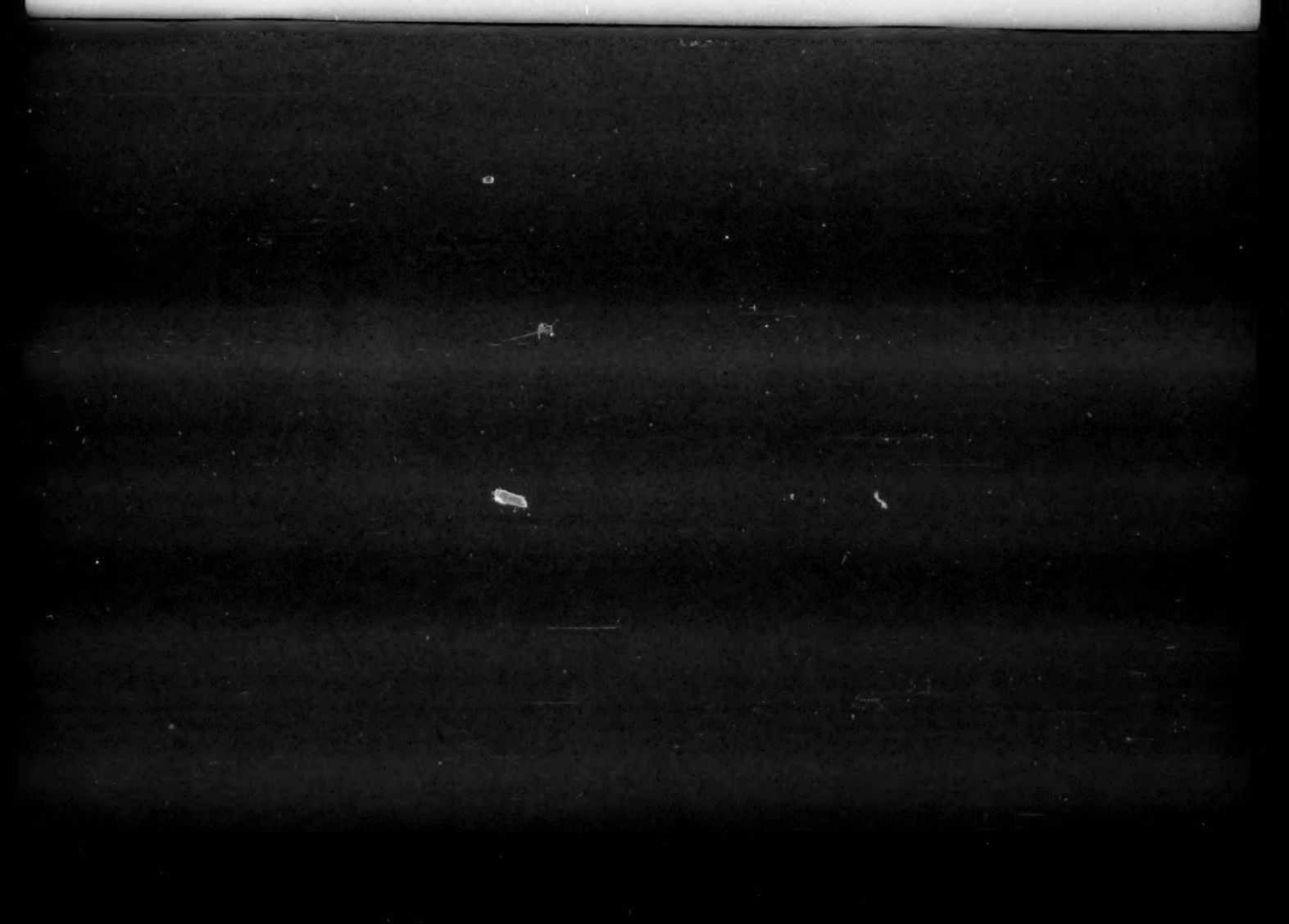
ASSOCIATION

OF

PACIFIC COAST GEOGRAPHERS

Volume 2

1936



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YEARBOOK

of the

ASSOCIATION OF PACIFIC COAST GEOGRAPHERS

Volume 2, 1936

Published at Cheney, Washington

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Association Affairs

The papers and abstracts included in this second volume of the "Yearbook of the Association of Pacific Coast Geographers" were among those presented at the second annual program meeting of the association held at the University of Washington in Seattle, June 18 and 19, 1936. Howard H. Martin, Head of the Department of Geography at the University of Washington, served as chairman of the committee on local arrangements assisted by Dr. Frances M. Earle and Willis B. Merriam. Dr. Earle took charge of the noon luncheon on Thursday and the annual dinner on Friday. Mr. Merriam assisted in conducting the field excursion around Seattle on Thursday afternoon. Interesting points studied on the field trip included: Lake Washington Canal and locks (largest north of Panama), Port of Seattle at Smith Cove and the downtown waterfront wharves, markets and shipping, cold storage warehouse, frozen fish aquarium fish packing, manufacturing establishments on the tide flats, Alki Point (site of first settlement), Fort Lawton, etc. Attendance at the program meetings totaled more than one hundred, including over thirty members of our association.

Officers for 1937 were elected as follows:

President — Howard H. Martin, University of Washington, Seattle.

Vice President—Walter Redford, Southern Oregon, Normal School, Ashland, Oregon.

Secretary-Treasurer — Hallock F. Raup, University of California at Los Angeles, Los Angeles, Calif.

Editor of "Yearbook" — Otis W. Freeman, State Normal School, Cheney, Washington.

Mr. John Leighly of the University of Californa at Berkeley constructed the cover design for the "Yearbook" that appears on this issue and donated the plate. Mr. Howard H. Martin of the University of Washington has been of much assistance in editing papers and abstracts published in the current "Yearbook."

The 1937 Meeting

The third annual meeting of the Association of Pacific Coast Geographers will be held in Denver, Colorado, in June, 1937, in conjunction with the meetings of the American Association for the Advancement of Science. As this is the centenary celebration of that organization a number of special features are being arranged and a large attendance from all parts of the United States is expected.

It is hoped that as many as possible of the members of the Pacific Geographers will plan to attend and contribute papers. Other geographers who are planning to be at the A.A.A.S. meeting and who are interested in presenting papers should communicate with the secretary, Dr. H. F. Raup, or with the president, Dr. Howard H. Martin. The A.A.A.S. meeting is set for June 21-26; at a later date Dr. Raup will notify all members of the exact date for the geography meeting.

YEARBOOK OF THE ASSOCIATION OF PACIFIC COAST GEOGRAPHERS

Volume 2 **1936**

The Association's Vignette

JOHN LEIGHLY

University of California, Berkeley, California

When the first issue of the Yearbook of the Association was published in 1935, the printer had at his disposal only a stock design with which to ornament its cover. Since other organizations similar to ours have, without exception, some distinctive design for use on their printed matter, it appeared to me that our Association might appropriately have one also. President Freeman and I discussed the question by letter during the winter of 1935-1936, and in the course of our correspondence Mr. Freeman, following the ancient and honorable tradition of presiding officers, suggested that I handle the matter by having some artist of my acquaintance design a vignette. Now the only artist I count among my friends can scarcely afford, in these hard times, to use his pen and brush in any nobler cause than making a living for his wife and himself; and I could not afford to pay him or any other artist for a design. Professional skill being thus excluded, I ventured to undertake the job with my own clumsy hands, leaving it to the Association, assembled in its meating of June, 1936, and unembarrassed by my presence, to accept or reject the result.

A map was the obvious kind of device to use as the nucleus of the design. But while other and more ambitious organizations may flaunt a globe or a map of the whole earth in their official marks, or arrogantly define their field of interest by the word "UBIQUE," it seemed that our modest Association might be content with something less inclusive. A map of the Pacific Coast, of North America, or of the Pacific States, that would recall some worthy exploratory accomplishment, was "indicated." The person most worthy of being thus commemorated is beyond doubt George Davidson, who not only did more than any other individual in mapping the Pacific Coast of the United States, but in addition was the first to occupy an academic chair of geography on the Coast. But Davidson's work was detailed, and was embodied in large-scale coast and harbor charts unsuited to the purpose in hand.

Necessity therefore led the search back to someone who performed the more extensive task of mapping the entire coast. Here there is no one to dispute for first place with George Vancouver, whose admirable surveys, made in the early nineties of the eighteenth century, extended from about lat-

itude 30 degrees (Bay of San Quintin in Lower California) northward and northwestward as far as Cook Inlet and Kodiak Island. Vancouver's claim to our recognition rests not only on his having provided the first adequate navigational charts of the coast in addition, the many names he gave to features of both water and land have been retained to perpetuate his memory. It is only necessary to leaf through one of the early editions of the Coast Pilot of California, Oregon, and Washington, written by George Davidson, to see how many names are due to Vancouver; to say nothing of the coasts of British Columbia and Alaska. These names are not confined to the part of the coast lying north of the Spanish settlements. Several "points" on the coast of southern California — Point Arguello, Point Sal, and Point Felipe, for example—inconspicuous among the multitude of Spanish names, were given by Vancouver in appreciation of courtesies shown him by Spanish officials and missionaries.

It is a part of Vancouver's general map of the coast, first published as chart 14 in the atlas volume accompanying the account of his expedition, "A voyage of discovery to the North Pacific Ocean and round the world" (1798), that is used in the design. All the maps in this atlas are fine examples of late eighteenth century map engraving. Between the dates of the first edition of "A voyage of discovery" and of the second edition (1801) the engraved copper plates used in printing the maps and other illustrations of the first edition were stolen; the maps accompanying the second edition—this time bound in with the volumes of text instead of being issued in a separate atlas—had to be engraved anew. The number of plates was reduced, in part by simple omission and in part by the combination of several charts on the same plate. The general map of the coast appeared alone on one plate in the first edition, but in the second the charts on sheet 15 of the atlas of 1798, "A Chart of the Sandwich Islands", "Part of the Gallapagos Isles", and "The Island of Cocoas", were combined with it as insets. In our design the space in which the name of the Association appears is part of the space occupied by the "Chart of the Sandwich Islands" on the second edition of the map.

In the edition of 1798, the map bore the following title, rather wordy but characteristic of the time: "A Chart showing part of the coast of N. W. America with the tracks of His Majesty's Sloop **Discovery** and Armed Tender **Chatham** Commanded by George Vancouver Esqr. and prepared from the foregoing Surveys under his immediate inspection by Lieut. Edwd. Roberts in which the Continental shore has been correctly Traced and Determined, from Lat. 29 degrees .54 N. and Long. 244 degrees .33 E. to Cape Douglas in Lat. 58 degrees .52 N. and Long. 207 degrees .20 E. during the Summers of 1792, 1793 and 1794." The title of the second edition is the same, except that the word "foregoing" is replaced by "original" (correction of engraver's error?). A good facsimile of the second edition of the map, slightly reduced, accompanies George Godwin's "Vancouver: a life, 1757-1798" (1931).

The engraved surface of the original map measures 60 by 90

cm. The great reduction involved in adapting even a part of it to the purposes of our design made necessary the omission of many details, conspicuously place names and the tracks of Vancouver's ships. The symbols for mountains are also simplified and greatly reduced in number. The conventionalized symbols representing missions, in California south of San Francisco Bay, though barely distinguishable in the design, are, relatively to the scale of the drawing, much enlarged from their modest size on the original, as is also the lettering of the names "New Georgia" and "New Albion."

Migratory Work Waves in the Skykomish Valley

LEONARD C. EKMAN
Skykomish, Washington

The Skykomish Valley of Washington, sometimes called the Steven's Pass region, is one of several valleys which head at the divide of the Cascade Mountains. The upper valley enclosed by steep mountain walls forms the "pan handle" of King County; the lower valley, beginning at Gold Bar comprises the southern part of Snohomish County. The entire valley has a length of seventy miles, with approximately thirty miles included within the Puget Sound Lowland.

In surface, southern Snohomish County rises gently from the coast, extends eastward in a series of rolling hills and valleys, continues with numerous plateaus, and then turns sharply upwaard in the more precipitous slopes of the Cascades. The upper valley has a fairly steep gradient which increases as the pass is reached.

The Skykomish River proper is formed by the junction of the Tye, Beckler and Foss Rivers near Skykomish. The North Fork joins the river at Index. This river system drains an area of approximately three hundred fifty-five square miles.

The Valley is definitely in a youthful stage of erosion. The upper valley is bounded by steep mountain slopes. A steep gradient causes a rapid flow and many falls along the river's course. The tributaries in many cases do not join the consequent drainage with accordant junctions and many lakes and marshes have as yet not been touched by this youthful drainage system. Although still in the stage of youth, the drainage pattern in the lower valley is more advanced. This results from the greater amount of leveling done by the Puget Sound glacier. The lower valley is characterized by low, rolling, lateral moraines, the valleys of which often contain lakes and undrained marshes. The glacier had its origin to the northward and the morainic relief consequently runs in a north-south direction.

The upper valley comprises a well defined physiographic unit. From the cirque at the summit, to the point of mergence with the lower valley, it has all the characteristics of a hanging valley. Although somewhat sinuous, it has a "U" shaped floor practically its entire length, and nowhere is it over a mile and a half in width. The floor is profusely strewn with glacial erratics, and prominent spurs project at intervals from the valley shoulders.

Climatic Characteristics

The Skykomish Valley is within the temperate marine climatic area of the Pacific Northwest, characterized by mild wet winters and cool summers. The region is situated directly in the path of the everchanging cyclonic storms.

In the winter months, the valley is drenched with rain by the prevailing westerlies as they sweep landward, dropping their load of moisture as they become cooled by the land mass. During the summer months this is reversed, as the land is then warmer than the ocean with the resultant lower rainfall, some months being almost rainless.

In a mountainous area of this type the relation of precipitation to topography is so pronounced that a rainfall and topographic map of the region show definite co-relations. The precipitation figures available give Monroe 43 inches per year and Startup 60 inches; Scenic, with an elevation of 2224 feet. has 83 inches.

There is likewise a definite relationship between snowfall and altitude, although data are not available from many stations. Monroe at an elevation of 72 feet averages 11 inches of snow per year. The now-abandoned station of Tye —3110 feet, the highest point at which consecutive records have been kept—averaged 332 inches of snow annually over a 13 year period.

Such a heavy snowfall upon the upper flanks of the valley is both an asset and a constant source of danger. The upper valley acts as a gigantic reservoir for the storage of moisture to be released gradually for use in the lower valley during the drier summer months. With the coming of warm rains, however, usually in the autumn after the first snow has fallen, the small tributary streams sometimes pour such volumes of water into the main river that a flood stage is quickly reached. The warm rain is often accompanied by a strong and equally warm wind which melts the snow rapidly. This wind resembles the famed chinook wind of the Rocky Mountains or the foehn wind of Switzerland.

Placer Logging

The greater part of the Skykomish Valley was originally covered with a thick stand of Douglas fir, hemlock, and western cedar, which provided the basis for the first wave of migratory occupance. Sawmills had been built at Seattle and Tacoma, and logging operations reached the lower Skykomish about 1860. The first influx of loggers was mainly from the New England states; some of them were ex-sailors who had come around the Horn and jumped ship at Victoria.

The crews were small, consisting generally of two or three men who used hand tools exclusively. This early "placer logging"—so-called because it was selective, taking only the finest trees—gradually skimmed out the most accessible timber along all the streams large enough to float a log. The loggers felled only trees which could be wedged or jacked directly into the water. At times of low water the trees were dropped where high water would later pick them up and float them down the river to the coast. They were gathered into rafts at the river mouth and then towed to the mills in Seattle or Tacoma.

Before the end of the first decade of placer logging a few of the

timber workers had established homes in the valley, thus giving rise to the first permanent settlement.

2. Placer Gold Mining

The second wave of migratory workmen entered the valley for the purpose of finding placer gold. This period extended intermittently from 1860 to 1894.

No rich strikes were made, but gold in small quantities was found on the river bars near Gold Bar, and in the Sultan Basin country. The amount found however, provided only small daily wages for the miners. Bars were panned or sluiced by individuals, and there were no large mining interests.

The mining period is not especially significant from the standpoint of settlement or mineral wealth produced. Gold mining however, stimulted trade in the valley. The miners were regular buyers of food and supplies which had to be brought up the river in Indian canoes, or sometimes on the backs of men. Thus, the river became the first trade artery for the Skykomish region. Mining continued spasmodically until the gold rush to Alaska in 1898, when nearly all the miners left for the richer deposits of the Yukon. Most of them did not return and mining interest in the valley declined.

3. Skid Road Logging

As timber along the immediate river slopes became exhausted, better means of getting the logs to the water had to be devised. The skid road was the solution to this problem. It consisted of small, peeled, fir logs, flattened on top, and placed firmly bedded in the ground, much as railroad ties are now laid to support the rails. Ox teams were used to pull the logs over

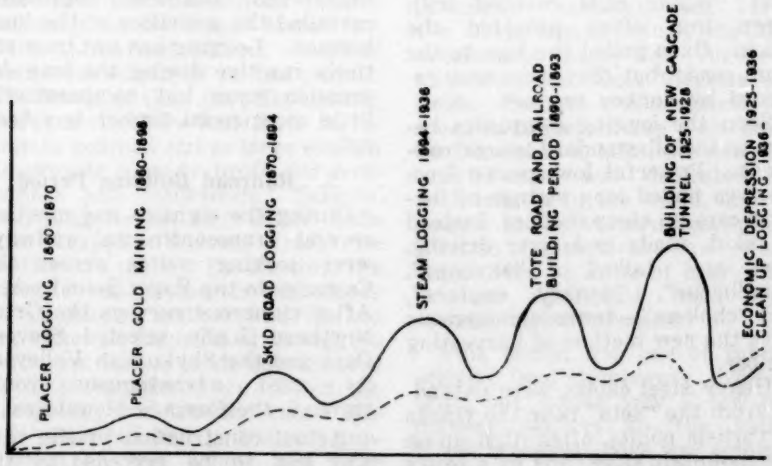
PLACER LOGGING 1860-1870
PLACER GOLD MINING 1860-1898
SKID ROAD LOGGING 1870-1894
STEAM LOGGING 1884-1936
TOTE ROAD AND RAILROAD BUILDING PERIOD 1890-1893
BUILDING OF NEW CASCADE TUNNEL 1925-1928
ECONOMIC DEPRESSION 1925-1936
CLEAN UP LOGGING 1936-

DIAGRAM THE DEVELOPMENT WAVES OF SKYKOMISH VALLEY POPULATION
—TEMPORARY WORK MIGRATIONS
--PERMANENT POPULATION (AGRICULTURAL)

these skid roads to the river or storage piles.

In 1876, the census listed 28 logging camps, employing 307 men and 322 oxen. Timber was cut in large amounts and great drives took place during the freshets of the river. Much timber was lost during drives, and often when booms had been made at the mouth of the river, they were swept out into the Sound by the force of the flood waters.

In addition to the increasing logging camp population, a number of permanent settlers were attracted to the valley during this period.

4. Steam Logging

As the primitive method of stripping the river banks had yielded to the skid road, so in turn the greased ways were displaced by more efficient methods. Steam logging reached the valley in 1894.

The equipment was crude at first; maple rails covered with scrap iron often provided the track. Oxen pulled the logs to the tram roads, but they were soon replaced by donkey engines.

Soon the logging companies began to install standard gauge railroads. Powerful low geared locomotives pulled long strings of logging cars up steep inclines. Instead of skid roads and river driving, men now talked of "skylines", "haulbacks", "donkey engines", and "chokers"—terms synonymous with the new method of harvesting timber.

Heavy steel cables were extended from the "sets" near the tracks to various points, often high up on the mountain sides; and by a series of blocks, logs could be pulled in from the higher elevations by the powerful donkey engines. They were then brought to the mills on cars built especially for log transportation.

Steam logging of the type described took millions of feet of timber from the valley. The logging area extended from the boundary of the restricted area logged by oxen, to the hillsides above Skykomish. Trees were cut as high on the hillsides as logging equipment would permit and marketable logs could be found.

With the passing of the old methods the transient type of logger began to disappear. Camps were becoming more permanent, since men as well as logs could be transported over the tracks; long distances to work could be covered in a short time. The logger could now establish a home if he chose, and become a member of a settled community.

Steam logging continued intermittently until 1929, when the widespread business depression curtailed the activities of the lumbermen. Logging has not been entirely inactive during the lean depression years but comparatively little commercial timber has been cut.

5. Railroad Building Period

During the eighties and nineties several transcontinental railways were seeking routes across the Cascades to tap Puget Sound ports. After numerous surveys the Great Northern finally selected Stevens Pass and the Skykomish Valley as its most advantageous route through the Cascade Mountains.

Actual construction of the railway had to be preceded by the building of a tote road from Sultan to the summit—a task of considerable difficulty since much of it was carried on during the rain and

snow of winter. By means of this rough road however, it was possible to haul in supplies and erect the construction camps needed for the grading crews. The building of the tote road itself caused a preliminary work flurry in the valley, which was pushed to boom proportions by the arrival of the grading crews and steel men.

The upper reaches to the west side of the pass were so steep that the original grade made use of a series of switchbacks, with trains of some seven cars each being shuttled back and forth from one level to the next. The line was completed in 1893. Some years later (1900) the switchback method was abandoned and a new lower level line opened. To secure this advantage a 2 2-3 mile horseshoe tunnel was bored on a ten degree curve in order to reach the desired level.

The building of the Great Northern put the Skykomish Valley definitely on the map. More than 3500 teams and several thousand men were employed on the project. The towns of Gold Bar, Skykomish, Index and others had their inception in railroad camps large enough to provide a ready profit for merchants and tradesmen. Saloons, gambling houses and dance halls also reaped a harvest from the workmen's money. By the time the railway was in operation hundreds of additional settlers had flocked in, either as farmers, or as loggers on virgin timber lands now assured of easy transportation. When the temporary construction crews finally departed the permanent population of the valley had been greatly augmented.

6. The Eight Mile Cascade Tunnel

The Great Northern had long been aware that by boring a tunnel at a still lower elevation under Stevens Pass the line could be shortened and the grade reduced. In 1925, the directors authorized the construction of an 8-mile tunnel penetrating the heart of the Cascade range. This necessitated the relocation of all but about seven miles of a 50-mile stretch of track between Peshastin and Scenic, involved the employment of some 2000 men, and the expenditure of $25,000,000.

To provide more working "faces" a pioneer tunnel was driven parallel to the route of the main railway tunnel, and crosscuts were driven to connect with it every fifteen hundred feet. This made accessible as many as eleven faces which could be operated simultaneously by the work crews.

For three years (1925-28) the valley experienced another work boom. The camps were full of experienced "hardrock men" from the Butte copper mines, the Minnesota iron range, New York subway jobs, and West Virginia coal fields. Several world records for speed in tunnel driving were made. On December 8, 1928, the new Cascade Tunnel was dedicated, the fifth longest in the world, and the longest in the western hemisphere. Electric locomotives now whisk trains over 75 miles of easy grade between Appleyard (near Wenatchee) and Skykomish.

This period was one of intense activity and temporary exploitation, but added only a few permanent settlers to the valley. When the great bore was completed the workmen left for new jobs; their tents and shacks were burned without removing the scanty furnishings.

7. "Clean Up" Logging Period

The valley is now experiencing another work wave which began a year or so ago. After a period of inactivity (1929-35) timber men are resuming work. It is estimated that 300 million feet of timber remain to be cut, an amount which will last approximately six years, after which the lumbering equipment will be dismantled. This so-called "clean-up" period will see the finish of the richest natural resource of the valley, and will end major logging in the area for many years to come.

The present influx of timbermen is somewhat unique as a work wave, since it will not add appreciably to the valley's population. The larger share of the men involved are former residents who were forced to leave during the years of depression. In many cases they had established homes prior to the logging shutdown, and are now back at their former occupations and living in their previously abandoned cottages.

The Agricultural Future

This paper is not primarily concerned with the growth of agriculture in the valley. As indicated in the accompanying diagram, however, farming began in the placer logging period and continued through all the migratory work periods described. It bears a definite relationship to the work migrations, since each influx of temporary workers caused (1) an increased demand for farm products, and (2) left a residue of workers who often remained in the valley as small farmers when their particular work wave receded.

With the previously dominant timber industry on the decline, the valley is now facing a change in its economic background. A definite transition from lumbering to farming is now under way; environmental conditions favor dairying as the leading type of adjustment in the future.

An Unsolved Phase of the Tacna-Arica Problem

GEORGE McCUTCHEN McBRIDE
University of California at Los Angeles

The Tacna-Arica problem for forty years kept Chile and Peru at sword's points. It threatened the peace of neighboring countries as well, and even endangered the friendly relations of all South America, since each one of the disputants persistently attempted to align its neighbors in its cause. To the relief of the continent (and, it may be said, of the world at large, inasmuch as both the United States and the League of Nations had unsuccessfully attempted to intervene with their friendly mediation) the question was finally settled by a treaty between the two nations in 1929. By this treaty, it will be remembered, the two countries agreed to divide the disputed provinces, Chile turning back to Peru the captive province of Tacna, and Peru, in turn yielding all claim to the province of Arica. It seemed that this had settled the long-standing controversy. One aspect of it, however, still remains unsolved. Bolivia, equally with Peru a losing contender in the nitrate war of 1879-1883, had repeat-

edly attempted to obtain recognition as an interested participant. Her efforts, however, were without avail, since she had formally alienated her coastal province to Chile, had accepted financial compensation for the surrender of her rights, and had spent the money which she received in recompense for that surrender. When the final division of territory took place, Bolivia was denied all share in the negotiations and was completely left out of the settlement. The unsolved aspect of the Tacna-Arica problem lies in this failure to recognize Bolivia-s interests.

In the Sala de Honor, or main auditorium of the old University of San Andre's at La Paz, there is a large painting that occupies most of the space on one side of the hall. This picture is before the eyes of every youth who studies in the University. It portrays (on the upper part of the canvas) a country of high mountain ranges and snow-covered peaks with a city and a populous rural district lying about the foot of the mountains. Below this scene stretches a broad band of clouds, and, in the lower half of the picture a bare, rocky coast occupies the entire space. Upon one of the rocks at the water's edge sits an Indian girl in typical Andean costume, supporting a large tri-colored banner—the conspicuous red, yellow and green bands of the rainbow; the emblem of the former Inca Empire and the flag of the present Republic of Bolivia. This painting depicts what may be considered Bolivia's greatest national aspiration. By this means (and many others) is constantly impressed upon the youth of the country the memory of their lost littoral province and the aspiration of the nation for an outlet of its own to the ocean.

Bolivia enjoys the right of transit across her neighboring countries, secured to her by treaties whereby goods may cross duty-free from her territory to the sea and vice versa. These privileges she recognizes, however, are always subject to the goodwill of her neighbors—and leave her far from independent in her contact with the outside world.

In Bolivia's desire for an independent outlet, it is upon the Tacna-Arica corridor that she has centered her hope. Access to the outside world at any other point seems hopelessly closed. Egress to the Atlantic is virtually impossible geographically, even if no political obstacles stood in the way. Though a railway now links her to the Atlantic, the distance is so great and the voyage thither so fraught with natural difficulties that Bolivians have never travelled nor traded in that direction to any great extent. The routes across her own territory to the upper Paraguay are even less feasible The great expanse of almost uninhabited and unproductive land in the Chaco and its northward extension makes an outlet there (even if she were to own the entire Chaco) of little value to her; while forests and swamps and unnavigable headwaters of the Amazon close her approach to the great waterways of that system for all her products except those of the Beni district itself. It takes a month or more to go from La Paz or Sucre to the Bolivian frontier with Brazil. Some have thought that Bolivia, in the Chaco War, was attempting to fight her way out to the Atlantic. If she ever thought of that conflict as being carried on for such a purpose, she

failed to take into account the essential facts of her geography.

Bolivia has always faced the Pacific. Her people live almost entirely in the Western section of her territory, five-sixths of her population being centered on the Andean plateau, within some 300 miles of the Pacific coast. The products which she exports, mainly tin, copper, silver and other metals come from this same region. Corocoro, just south of Lake Titicaca supplies most of the copper, the Quimza Cruz region to the southeast of La Paz yields most of the tin, and the near-by Oruro-Potosi district is the source of her silver. All of these regions drain almost inevitably towards the Pacific. These metals constitute from 75 to 90% of her exports. Only about 5% of her foreign trade finds its way out to the Atlantic, some 2%, (mostly rubber) going down the Bolivian tributaries of the Amazon, still less out via the Argentine, and but an insignificant amount crossing the Chaco to the Paraguay. Travel follows closly these same lines, Bolivians and foreigners alike leaving or entering the country almost entirely by way of the three railways that connect with the Pacific. Travel and trade follow the lines of least resistance in thus seeking the Pacific rather than the Atlantic. This has resulted in making Bolivia essentially a West coast country. Her outlook has always been in that direction.

In view of this westward facing attitude of Bolivia it may seem strange that she parted with her own province without greater resistance during and after the nitrate war. But it must be remembered that at that time Bolivia was exploiting few of her mineral resources, and that her people had contented themselves with maintaining a subsistence economy among the remote valleys and basins of the Andes. The situation has changed decidedly now and Bolivia is actively engaged in export trade. Her mines supply approximately one-third of the tin of the world and she exports copper in large quantities. A large part of her government revenue comes from the exportation of these commodities. Hence an outlet to the sea means far more to her at present than it meant a generation ago.

Limited to an outlet westward, the Bolivians consider that there is but one feasible corridor by which they may reach the Pacific. It seems unthinkable that either Chile or Peru would cut off a part of their respective territories by ceding a strip of land at any other point. To do so would be to duplicate the problem of East Prussia and would probably create an equally serious new problem. The only place at which a corridor could be located that would not thus detach a segment of one or the other would be along the newly laid boundary which runs down through the Tacna-Arica district. While in the treaty by which Peru and Chile finally settled their controversy, both pledged themselves to alienate no part of the territory acquired to a third party, it is easily seen that the peace of the continent might be furthered by the creation of a buffer strip separting these two traditional antagonists.

This strip happens to coincide closely with the road used by the Bolivian people as their most natural avenue to the coast. Long before any one of the three republics involved became an independent

nation the people from the Spanish settlements situated on the Lake Titicaca altiplano were accustomed to reach the sea by this route. As early as 1570 the Spanish crown decreed that export from the Charcas province, as the Lake Titicaca region was then called, should go out via the port of Arica and that importations should enter at the same port. Silver from Potosi and gold from the vicinity of La Paz found their way by caravans of llamas, mules and donkeys across the western cordillera and down to Arica for shipment. Travellers followed the same route. Incoming missionaries and colonial officials commonly travelled to Charcas via the same road. For several centuries this has been one of the well-marked highways of South America. It still holds its place as the most used avenue to and from the Bolivian plateau. Though a number of other trails from western Bolivia cross the Cordillera Occidental toward the sea no one of them has been of such importance as this route from Lake Titicaca to Arica. Of the three railways now connecting Bolivia with the Pacific, that from La Paz to Arica is the shortest, the one that requires least time, that necessitates the least rehandling of shipments and that carries the largest amount of freight. From La Paz to Antofagasta it is 711 miles: from La Paz to Mollendo 531, while from La Paz to Arica it is but 278 miles. Wheras it takes a passenger 30 hours to reach Antofagasta from La Paz, and at least 35 hours to reach Mollendo, the tripfrom La Paz to Arica requires only 17 hours.

It is of interest to examine this historic route in some detail to see what features have served to deflect trade and travel along this line, and have given it such importance as Bolivia's main outlet to the coast.

Lines from many points of the eastern Andes, their piedmont slopes and their high valley-heads (from La Paz, Oruro, Cochabamba, Potosi and intervening places) converge at several crossings of the Desaguadero, the outlet for Lake Titicaca. Westward from this river the trails converge still more as they approach the western Cordillera. A number of them unite to follow the small Mauri River upward toward the summit of the mountains. This "river" is little more than a tiny brook but the valley in which its waters flow intermittently affords a well graded avenue to the very crest of the Cordillera. When the summit is reached there is a still farther converging of lines into one of the most used, if not one of the most famous, of Andean passes. Here is located the Ancomarca "apacheta" as mountain gateways are called in this part of the Andes. Water, ice and wind have here notched the high crest of the Cordillera, leaving a gap through the summit at an elevation of 14,085 feet, whereas on both sides rise formidable masses to elevations of 17,000 and 19,000 feet respectfully. This pass is seldom blocked with snow and that only for a few hours or days at a time. Precipitation is so light on the western Andes that it is rare to find a fall of more than a few inches of snow even at such an elevation. Both southward and northward from Ancomarca other passes have been used but this has long been the most frequented.

From the summit one descends by extremely sharp grades along

the western slope of the Andes. Caravans of mules and llamas find it difficult to descend this bold escarpment and still more difficult to ascend with their loads of imported goods. The Arica—La Paz railway uses twenty-four miles of cog rails in the descent. Here again nature has provided the avenues of easiest travel. Though the west coast desert reaches virtually to the top of the mountains, several small streams have carved out valleys that provide avenues coastward. From the Ancomarca Pass the Lluta River takes its beginnings and affords a depression utilized for some distance by both caravan road and railway. Northward from the Lluta the Caplina descends in similar fashion. Southward the Azapa has canyoned the steep slope. At places in each of these depressions the canyon is too rugged to admit travel but the roads follow along the flanking slopes. In their lower sections all the valleys open out slightly into narrow-bottomed canyons and the roads parallel thin lines of irrigation farming. By whatever pass the cordillera is crossed or by whatever canyon the descent is made, trails converge at the port of Arica, which has concentrated in itself most of the trade and travel from these various routes.

It is this outlet which Bolivia still thinks of as her predestined means of contact with the outside world. Her desire to acquire a corridor here is no new ambition. In 1826 her newly created government sought the area of Tacna and Arica, when independence separated her from Peru across whose territory she had been free to travel so long as both were mere colonies of Spain. Though she herself held a long section of the coast it was across Tacna and Arica that she found her most natural outlet. Bolivia parted with her own littoral province so much the more willingly after the nitrate war since her real outlet to the sea (insofar as she used an outlet at all) was via Arica. When export of her metals became of importance she tried repeatedly to secure from Chile asd Peru a concession of this route across the disputed land. Each of the contestants looked at times with sympathy upon her aspirations, but neither recognized in the other the right to make any cession. In 1926 when solution of the Tacna-Arica problem seemed at a stale mate, Secretary Kellogg proposed that the two provinces be turned over to Bolivia. The suggestion, however, was not acceptable to the two rival claimants and final settlement left Bolivia still without her outlet to the sea.

The political geographer is inclined to ask whether the problem of Tacna-Arica will ever be solved until Bolivia is given an avenue of egress along her historic highway to the sea. Will peace in this part of the world be possible so long as Bolivia remains land-locked and so long as her greatest national aspiration remains unmet.

Population Growth in the Puget Sound Region

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Acting upon the suggestion of an English geographer that ninety-nine percent of geography can be expressed in maps, a series of seven dot and circle maps has been prepared to show the growth of Puget Sound cities by census decades from 1870 to 1930. The remarks that follow represent an attempt to evaluate some of the geographic conditions that help to explain the facts thus illustrated.

Old Fort Nisqually, the first white settlement on Puget Sound, was established by the Hudson's Bay Fur Co. as an agricultural station and transfer point in 1833. The permanent occupation of the region began a few years later, however, through the expansion of American settlement northward from the Willamette Valley. Tumwater, at the head of Budd's Inlet where the eighty-five foot fall of the Deschutes River within three hundred feet provided power for a mill site, was settled in 1845. From this location contact with the Columbia River settlements was relatively easy by way of the numerous prairies and the Cowlitz River. Fertile prairies nearby encouraged subsistence agriculture, difficult elsewhere along the heavily wooded shores of the Sound. The equivalent of a cash crop existed in hand-split shingles from straight grained Western Red Cedar which could be exchanged for supplies at the Hudson's Bay Co. store at Fort Nisqually.

Once the westward moving wave of American settlement had reached Puget Sound, it spread rapidly along the shores of this great water highway. News of the discovery of gold in California came by boat in 1848 and almost depopulated the struggling settlements. A territorial census taken in 1849 showed 304 people in all Oregon north of the Columbia River, only 189 of whom were American citizens. By 1851 many of the original settlers had returned from the gold fields bringing with them not only increased capital and new recruits, but what was more valuable, the knowledge that San Francisco offered a ready market for the timber and agricultural products of the Sound Region. The federal census of 1850 had already reflected this return, a total of 1,111 persons being counted north of the Columbia.

The decade from 1850 to 1860 was the pioneer period of settlement in the Puget Sound Region. The economic possibilities of the Sound littoral were thoroughly investigated and their development begun. By 1855 there were sixteen saw-mills in operation at widely scattered locations; crews of men at work getting out logs, piles and ship's spars along the water's edge; coal had been discovered at several easily accessible locations and was soon being shipped in small quantities to California; in fact, the economic life of the region was well established. By 1860 there were 11,000 people in Washington Territory, about half of whom were located in the Sound region.

The development of towns proceeded slowly during the next two decades. The census of 1870 shows only two cities with a population

over 1,000, namely, Olympia and Seattle with about 1,200 people each. A dozen smaller mill towns with from 100 to 300 inhabitants were scattered along the shores. By 1880 one more city, Tacoma, had acquired a population of 1,000. Olympia had added only 29 inhabitants, while Seattle was already showing the potentialities of its more central location by having tripled in size during the decade. The total population of the region had reached 25,000. Active logging operations had been extended to all parts of the Sound, and fertile alluvial lowlands of the Puyallup, White and Snohomish valleys were rapidly being cleared of their timber and placed under cultivation.

The map of Puget Sound cities in 1890 reveals the complex nature of our problems. Instead of the three cities of 1880, the largest of which had only 3,500 inhabitants, we find nine cities over 1,000, two of which have passed the 35,000 mark; one new entry has exceeded 8,000 and two others have more than 4,500 each. The total population had increased in ten years from about 25,000 to over 180,000 and the percent of this in cities over 1,000 from 23.6 to 56. No simple explanation of this accelerated growth is possible. Numerous factors, both geographic and economic, were at work, only the more important of which can be pointed out here.

The coming of the transcontinental railroad brought the boom days of the 80's, only partially revealed by the census figures. Tacoma had about 7,000 people in 1885. Two years later it had reached 12,000 and by 1890, 36,000. Thus was reflected the selection of this city as the Puget Sound terminus of the Northern Pacific. Other cities had hoped, prayed, plotted and boomed in anticipation, only to be disappointed. No one site possessed any greatly superior natural advantage. Almost every ambitious town from Olympia to Bellingham dreamed of becoming the "magic city", while the railroad company apparently vacillated from one to another. But no matter where the railroad touched the Sound, the facilities of water transportation upon the inland sea enabled it to tap the resources of the entire region and a general growth of population followed.

With contact by rail once established between Puget Sound and the East, large scale lumber production increased rapidly, a factor which continued to dominate the economic development of the region for the next two decades. The number of mills in Washington jumped from 37 in 1880 to 310 in 1890, while the annual value of their product rose from $1,700,000 to $15,000,000. Between June 30, 1889 and June 30, 1890 2,598 vessels passed the light at Cape Flattery. Puget Sound had arrived as a lumber shipping center.

Agriculture expansion, too, contributed to the population growth of the 80's, the number of farms in the region increasing from 1,680 to 4,158. Most of this increase occured in the fertile alluvial valleys near the two large cities of Seattle and Tacoma which, together with the smaller mill towns and logging camps, furnished a local market of considerable size for farm products.

The map of 1900 reflects the continuing influences of railroads, lumbering, shipping and agriculture upon the population growth of the region as a whole. A new

factor must be considered, however, to explain the spurt shown by Seattle which had almost doubled in population since 1890 while its rival city to the south had remained practically stationary. Gold had been discovered in Alaska and Seattle was beginning to profit from its position as the outfitting center and chief shipping point for the Alaskan trade.

Eastern capital was now entering the lumber industry in large amounts and was directly responsible for the addition during the decade from 1890 to 1900 of the last major city. This was Everett, some thirty miles north of Seattle, a planned city centered around a shipyard, a paper mill, a wire-nail factory, and a large saw-mill. Within ten years after it was founded, Everett ranked fourth in size among Puget Sound cities.

By 1910 the urban pattern of the Puget Sound region was practically mature in form. During the preceeding decade ten cities had been added to those over 1,000 in population, which now totalled twenty-four. Washington had become the leading lumber producing state in the nation with an increase in annual production of over 300 percent since 1900. The number of farms had just about doubled in ten years, a fact reflected on the map of 1910 by the emergence of a number of small cities in the four major lowlands. The population of the region had more than doubled during the decade, the increase being most noticeable in the four major cities of Seattle, Tacoma, Bellingham and Everett which together contained slightly over sixty percent of the population of the entire region.

The facts shown by the 1920 and 1930 maps call for little further interpretation in terms of basic adjustments. All the Puget Sound ports shared in the increased shipping that resulted from the opening of the Panama Canal and from the World War. In 1919 the total value of imports and exports for the Washington Customs District reached the all-time high of $588,000,000 whereas in 1910 they had totalled about $60,000,000. The percent of population in cities over 1,000 reached 70 in 1920, a proportion which was probably too high for the region to maintain permanently, declining in fact to 66 percent by 1930 and to a still lower figure during the depression years that followed. Five cities and two counties showed actual decreases decreases in population in 1920 over 1910, an indication of declining timber resources and consequent readjustments in the economic life of the region. The period from 1920 to 1930 was one of extensive highway building which provided the region with a network of good roads and further consolidated the concentration of population in the larger cities.

In conclusion, the geographic factors of major significance in the population growth of the Puget Sound region may be summarized as follows:

1. The Inland Sea of Puget Sound itself which, with its ramifications far into the heart of western Washington, provided easy access to natural resources and a convenient means of local transportation.

2. The dense forest cover of fir, cedar, hemlock and spruce which extended from tidewater to the foothills of the nearby mountains and provided from the very beginnings of settlement a ready source of special products and raw mater-

ials for export and manufacture.

3. The several large rivers of the eastern shore which have deposited their loads of alluvial material in the lowland regions and thus built up a number of rich agricultural districts in a region generally lacking in soil fertility.

4. The mild temperate marine climate of the region which permits almost year-around logging and lumbering operations and has encouraged such specialized forms of agriculture as the dairy, poultry, berry and vegetable industries.

5. The location of the region as the gateway to Alaska and the Orient with their rich commercial possibilities.

Industrial Seattle

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Among the various methods of analyzing the type and extent of industrialization in an urban area, the ideological sketch is of definite value. By breaking down and regrouping the statistical data of manufactures, it is possible to arrange the resulting classified groups into graphic pyramidal form, and thus determine whether or not any given city has what may be called an "industrial personality."

By applying this method to Seattle the resulting sketch shows an unusually large pyramidal base of the common subsistence industries, universal in every urban center with 300,000 or more population.

Rising above this predominant base are three types of industries which serve to give Seattle a certain amount of industrial personality. First is the wood-working group, including lumber, a declining shingle industry, and a steadily increasing furniture industry. Second is the mechanical group, including marine engineering and its allied crafts, and the relatively new airplane plants. Third in importance is the processing of foodstuffs for distant markets, including the canning and quick-freezing of fish, fruits and vegetables, the milling of flour, and the preparation of coffee, tea and spices.

By further analysis of industrial Seattle, using both statistical and graphical comparison, the following conclusions are reached:

1. Such a large proportion of Seattle's manufactures fall within the subsistence classification that its industrial personality is not well defined.
2. Hinterland raw materials, particularly wood, have long been the dominant basis for manufacture.
3. Entrepot monufacture — the processing of commercial materials passing through Seattle —is far less than might be expected.
4. Available and potential hydroelectric power is adequate for a much greater industrial development.
5. In its present stage Seattle is more definitely a commercial than an industrial city.

Climates of the Puget Sound Lowland

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The lowland in western Wash-Casington between the Olympic and Cascade mountains is an area having a temperate marine climate. Three-fourths of the moisture adequate for most agricultural crops comes during the long winter rainy season. The coldest month is well above freezing. The sky is overcast four-fifts of the time. The summer is cool, sunny, and nearly rainless. The frost-free period is nearly eight months long.

Though all the lowland has these general climatic features, the mountains to the east, north and west, the sources and trajectories of the visiting air masses, the location of the mountain passes, and the moderate relief of the valley floor itself all conspire to produce wide climatic differences within short distances.

The Olympics cast an intense rain shadow which reflects the general altitude of this great precipitation barrier. Near the northern end of the valley there is less moisture than at the southern end. This is illustrated by the average precipitation of a series of stations, from north to south, in the middle of the lowland. Anacortes has 27 in., Everett 32 in., Seattle 31.5 in., Tacoma 40 in., Olympia 52 in., and Castle Rock 54 in. Sequim, only 40 miles airline from Mt. Olympus but to the leeward, has a mean of less than 16 in. With reference to the mountains, this series shows that the shielding effect is dominantly toward the east northeast, or the major rain bearing wind is from the west southwest. The low hills of southwestern Washington produce an area of less rainfall in the valley as compared to regions both north and south of it.

The Cascades, too, have their effect on the precipitation though they lie to the leeward of the winter wind. Eastward from the middle of the valley there is a sharp increase in the total yearly amount. The isohyets closely parallel the mountains. This is the result of of the gradual lifting of the moist winter Polar Pacific air which blocks itself on the western slope of the mountains. This same principle operates west of the Olympics producing heavy rain well to the windward of the actual slope of the mountains. There is a general increase of moisture amounts with higher altitude, for Seattle (alt. 125 ft.) has 31.5 in., Startup (alt. 560 ft.) 56 in., Monte Cristo (alt. 2900 ft.) an indicated 118 in., Mt. Baker Lodge (alt. 4,200 ft.) 104 in., and Paradise Inn (alt. 5,500 ft.) 100 in. This series further indicates that the zone of maximum precipitation is somewhere between 3,000 and 4,000 ft. above sea level. The yearly amounts in the lowland are substantially less than those of corresponding altitudes on the west slope of the Olympics. Here it has been calculated from the discharge of the Wynoochee River that the upper reaches receive more than 270 in.

The Cascade range further acts as an effective temperature barrier in winter, for the relatively even 6,000 ft. crest prevents the westward spreading of the cold Polar continental air which frequently

floods the Columbia Plateau. Two low passes, the Columbia gap on the south and the Fraser gap on the north permit this cold air to flow westward unhindered and fill the adjacent portions of the valley. The southern end has recorded lower minima than the northern end owing to the greater width of the Columbia River gap. The central part of the lowland is notably warmer owing to the absence of low mountain passes to the east. However, when the cold Polar air is of sufficient depth to pour westward over the top of the Cascades, the descending air is warmed rapidly by descent and the lowland enjoys a true foehn.

The Physiography of Western Washington

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Western Washington is divided into three topographic units all trending in a north-south direction.

The westernmost of these is an extension of the Coast ranges culminating in the mile high Olympic mountains. The known rocks of the Olympics are essentially Tertiary sediments and volcanics which have been thrown into a series of N.W.—S.E. trending folds. The more intensely metamorphosed rocks have not yet been correlated. Subaerial and glacial erosion have fashioned these rocks into an extremely rugged range.

The central unit is the Puget Sound trough. This depression is approximately 350 miles long and 50 miles wide and the altitude of the floor seldom exceeds 500 feet. Strata similar to those found in the Olympics also underlie Puget Sound. The area north of Whidby island however, is a notable exception. Unconformably overlying these strata is a generous covering of glacial debris which locally attains thicknesses of 1000 feet. Lobes of the Cordilleran ice sheet, augmented by valley glaciers both from the Olympics and Cascade ranges, extended as far south as the divide separating the drainage of Puget Sound from that of the Chehalis river.

At least two successive advances of ice have been recorded. According to Bretz, nine-tenths of all the Pleistocene deposits in Puget Sound is sorted glacial material derived from the waning ice of the first (Admiralty) glaciation. These sediments were severely attacked by subaerial erosion in interglacial (Puyallup) time and the features we know today were fashioned for the most part during this interim. The second glaciation (Vashon) provided a veneer of drift over most of the area except in the southern portion where outwash material is more plentiful.

The third and eastermost unit is the Cascade range whose peaks average 6000 feet in elevation. At certain localities along the abrupt western side of this range there is strong evidence of faulting. Aided by glaciers, the streams draining the western side of the Cascades have bitten deeply into this rather even crested upland. The resulting topography is a diversely sculptured and scenic range with a relief of 4000 feet.

Anthropogeography of the Cascade Highlanders

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The upper Cowlitz Valley of eastern Lewis County, Washington, lies in the western foothills of the Cascade Range to the south of Mt. Rainier. In the early 1880's a few mountaineers from Appalachia came west, worked back into this isolated area and discovered an environment much to their liking. This was the beginning of a migration mainly from Kentucky and Tennessee. It continued until the so-called "Big Bottom" and its converging smaller branches were generously sprinkled with settlers who brought with them most of the culture characteristics of the Appalachians. In Lewis County the upper Cowlitz country is now frequently referred to as Little Kentucky.

Since the arrival of the first families fifty years ago, three generations have been born in this area, but the comparative isolation and intermarriage have only served to intensify the mountaineer pattern. The slow twanging speech, racial prejudices, feuds, suspicious, superstitions, and customs of the Appalachians are still an integral part of these Cascade highlanders.

As in their former Kentucky and Tennessee homes, the hill people of the Big Bottom region have a circumscribed economic existence, based mainly on desultory subsistence farming. The men also hunt and fish in and out of season, work in lumber camps, sometimes serve as guides, pick ferns, and make "corn likker", the latter occupation causing considerable friction with the authorities.

Most of the homes are log cabins or puncheon-floored shacks. Homemade furniture is the rule, and the meagre- assortment of dishes remains on the table from one meal to the next. Most foods are fried in home-made lard, hot bread is served at every meal, and the half-churned butter is "fished for" when needed. A few supplies come from the outside, mainly flour, salt, and baking powder. The local home-made lye soap is hard on the hands, but the highlander finds it a cheaper and better "dirt-knocker" than the "boughten" variety.

Illiteracy is common among the older people and schooling does not as yet reach all the children. Many of the older generation still insist that the world is flat. Most of the community belong to the hard-shell Baptist faith; they hold the annual ceremonial foot-wash on the second Friday, Saturday and Sunday of August.

With the coming of the C.C.C. camps and the inauguration of a comprehensive road-building program, the isolation of the Upper Cowlitz is being gradually lessened. The building of a projected trunk highway up the valley to Mt. Rainier will eventually draw these mountain people into closer contact with the outside world. With the breakdown of isolation will probably come the eventual disappearance of their transferred Appalachian mores.

Production Trends in the Northwest Fisheries

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With their subsidiary and related industries, fisheries form an integral part of the natural economy of the Northwest. In Washington, British Columbia and Alaska, the market value of fisheries products exceeds $100,000,000 a year. To this total salmon contributes 78%, halibut 15% and minor fisheries 7%.

Begun in 1866 on the Columbia River, commercial salmon fishing has been pushed north and west to Bristol Bay. Although the older southern areas continue to contribute to the total, the maximum catch now comes from Alaskan waters. With the exception of the Columbia River, long regulated jointly by Oregon and Washington, every major salmon area has been or is now being over-fished. In Washington and Alaska where a single governmental authority is in control, the danger of permanent depletion is not great. In the boundary waters of the Fraser River system there has been drastic depletion of sockeye salmon. Canadian-American treaty regulation on the Frazer began in 1918, but has not been altogether effective; the new treaty of 1936 promises little more insurance against exploitation.

The center of halibut fishing has also moved steadily west and north as nearby southern waters were depleted. Peak production, 63,000,000 pounds was reached in 1914-1915, followed by a steady decline to about 40,000,000 pounds. To check overfishing and the taking of immature halibut, Canada and the United States organized a joint International Fisheries Commission in 1925. The Commission has made careful studies, defined regulatory areas, set aside nursery areas, and imposed quotas and a closed season. The fishermen have cooperated voluntarily with rules designed to stabilize the industry and maintain steady employment. The annual take is now set at 47,000,000 pounds.

Among the minor fisheries, whale, cod, herring, clams, oysters, shrimp, crab and pilchard yield the largest returns. Shellfish, especially Washington oysters, have shown the best gains in volume and value during the past decade. The other fish products vary greatly from year to year. Among them, the most definite trend is the increasing proportion of the catch utilized for meal and fertilizer.

Although certain of the minor fisheres are capable of moderate expansion, they will need careful regulation for permanency. Both the salmon and halibut industries have reached their maximum expansion; at best they can only be maintained or very slightly increased. The present trend in all Northwest fisheries indicates (1) maintenance rather than increase, and (2) increasing regulation designed for long-time stabilization.

Commercial Seattle

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The city should be regarded as a social organism adjusted to its natural environment. Its form and function represent specific phases of such adjustments. Cities are devices employed by society to provide subsistence for a larger population than can be cared for by rural activities. Since cities are collective units of human beings, they surficially possess in collection form many of the traits which characterize the individual humans making up the urban group. But a city is not merely an agglomeration of humans, it is an entity separate and distinct from the members composing the city.

Seattle has developed from a pioneer hamlet into a city of 400,000 people within the short period of some seventy-five years. Seattle, or any city, must be viewed as the culminating result of the environmental elements acting upon human adjustments.

The intrinsic values of many sites are obvious upon first inspection; others reveal their inherent importance only under the differential stress of long continued competitive selection. This latter appears to have been true in the case of Seattle's site. Although the Puget Sound Region was one of the last littorals of the United States to be settled by the American people, it is obviously one which is highly favorable for human occupancy.

The first pioneers who settled at Alki Point inaugurated a commercial type of adjustment in Seattle. Nature provided products which could be exported and the pioieers were able to export a cargo of logs within a few weeks after they arrived at Alki Point. Lumber, logs and fish were the only products exported for i considerable period of time. Since these settlers had been engaged in commerce before they came to the Puget Sound country, it was natural that they should continue this activity, particularly when they found a ready sale for their initial shipments of timber.

Seattle today is primarly an exporting port. An analysis of exports from Seattle for the past ten years shows that the commodities wheat, fruit, lumber, and fish are the four important products exported. There is no commodity which ranks a close fifth. The countries which stand high as receivers of these products are China, Hongkong, Japan, Philippines, Australia, New Zealand, Germany, Netherlands, France, England, Peru, and Canada.

On the other hand the chief imports to Seattle come from a few countries. These are Canada, Japan, China, Philippines, and a few scattered countries with small percentages. The leading imports are coal, lumber, paper, fish, silk, vegetable fibers, and a few minerals.

Seattle's domestic trade is confined largely to the State of Washington and the areas immediately surrounding the State.

Historical Geography of the Gadsden Purchase

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The politico-statesman has committed many actual crimes through ignorance of the earth as the home of man. Geography, then, should pay sincere tribute to those few far-sighted men in the public life of the past who have been both scientist and servant.

The vaunted vision of Daniel Webster failed him a few miles beyond the Mississippi River. Alaska was, in the United States Senate, "Seward's Polar Bear Garden." Senator Benton of Missouri described the areal treasures of the Gadsden Purchase as, "Utterly desolate, desert, and God-forsaken." Sir George Simpson convinced Victorian England that all Canada, west and north of the Great Lakes, was an impossible wilderness and devoid of all agricultural possibilities.

In contrast, Thomas Jefferson gave us the West, Andrew Jackson, Florida, and James Gadsden, his great "Purchase."

Strangely, all three of these bloodless acquisitions of territory essential to the future greatsess of the United States were inspired by our first geographer-president, Thomas Jefferson. These are, briefly, the facts that link the three territorial purchases together:

Andrew Jackson, our first president from west of the Atlantic Seaboard, was greatly influenced in his political vision by Jefferson.

In 1814 James Gadsden was Jackson's aide-de-camp and became western-minded through Jackson's influence.

Later, in 1850, Gadsden was retired from the presidency of the South Carolina R.R. by his stockholders because he insisted on a westward extension toward the Pacific.

Gadsden told his story to Marcy, Sec. of State under Pres. Pierce, and was appointed Ambassador to Mexico by Marcy. Together, Gadsden and Marcy found that due to a mistake in the Treaty of Guadalupe the United States had been deprived of a half degree of latitude and two degrees of longitude, throwing EL PASO below the American Line. This would throw any possible railroad going west, over N. Franklin Peak, 7140 feet altitude, would miss the gentle gradients of the Mesilla Valley, on the present Meming Route, and would thereby make the proposed western road impossible, except through Mexican territory. Then, too, both men had learned of the mineral wealth south of the Gila.

Santa Ansa had been returned to power in Mexico, needed money, and was willing to deal. He boasted, later, about the ten million purchase price, never learning that Gadsden had short-changed him five million.

Thus did we acquire an agricultural and mineral empire.

Agricultural Trends in Western Washington

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Western Washington is a region of relatively small truck and dairy farms averaging 51 acres, in marked contrast to drier Eastern Washington with its large wheat farms averaging 250 to 1000 acres. While the rural population of Eastern Washington remained almost stationary from 1910 to 1930, Western Washington experienced an increase of 65 per cent during the same period. Within Western Washington there is a definite concentration of farming on the Puget Sound Lowland with its combined advantages of a marine type climate with long growing season, soils which are rich or responsive to fertilizer, and the stimulus of nearby urban centers.

In addition to the farm population engaged exclusively in agriculture, the Puget Sound area has an unusual amount of part-time agriculture. Owners of small cleared tracts work part of the year in mills or logging camps; many people employed in cities live in the country and cultivate a garden or small farm in their spare time. Subsistence farming of this type grew rapidly during the depression and has helped to increase the number of small farms now listed in this area. Most of the newer holdings are recently cut-over lands; the difficulty and expense of removing stumps have operated to keep the farms small in size.

In many river valleys west of the Cascades dairying is the most profitable agricultural adjustment. The grazing season is long, and farm crops, such as hay and oats, provide additional feed. The dairy industry is scattered but highly commercialized, and the output of dairy products is increasing. The Puget Sound cities consume most of the milk produced within an easy radius. Milk from the more distant farms goes to the creamery for manufacture into butter, cheese, and tinned milk. Washington farmers have adopted many of the principles of Danish cooperative dairying, but have not as yet followed the Danish system of pig-feeding as a profitable side-line.

Poultry raising and egg production have increased greatly in the past fifteen years, especially in Whatcom, King, Snohomish, and Island counties. Cooperative societies have been quite successful in developing and standardizing the export egg business.

The acreage in vegetables has grown steadily, with beans, cabbage, cauliflower, spinach, sweet corn, rhubarb, and tomatoes as the favorite commercial crops. The planting of peas in one county, Skagit, increased from 5 acres in 1919 to 691 acres in 1929. In the same decade the Western Washington lettuce acreage increased from 200 to 2100 acres. Vegetables are grown for shipment to other parts of the United States, as well as for the local market.

Selected areas in the Puget Sound lowland are especially suited to strawberries, raspberries, and loganberries, which have become highly specialized crops. In the Puyallup-Sumner area, famous for its berries as well as for its bulbs, the best truck lands are high in price.

The general trend in Western Washington agriculture is toward greater crop specialization, which in turn requires smaller units of land and more intensive cultivation and fertilization. As now constituted it is essentially a vegetable-berry-poultry-dairy proposition. Agriculture is also markedly influenced by the market possibilities of the urban centers around Puget Sound.

Soil Erosion as a Geographic Determinant in the Northwest

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Soil and water are vital determinants of socio-economic adjustments. Fertile soil, abundant water, and productive protective vegetative cover form a trio of elements in the natural environment which the geographer cannot overlook. Until recently the supposition has existed that the supply of these elements of the natural environment was relatively inexhaustible. Scientific research, as well as casual observations, have proved the supposition false. They have proved that certain definite conservation measures are necessary to insure future soil and water supply.

The Pacific Northwest although an infant in terms of years of settlement, has already become a region suffering severely from soil and water losses. A survey of geographic subdivisions of the Pacific Northwest states discloses that numerous changes of a social and economic nature have already taken place as a result of the depletion of the supply of soil and water.

The production of cultivated crops in the famous Palouse wheat belt had hardly begun 65 years ago. Yet in slightly over a half century many farms have run the gauntlet of soil mining to the point where large acreages are no longer suited to cultivation. These farms, once prosperous, played a definite part in determining the course of affairs in the communities concerned. The land, likewise, played a definite part in determining the type and extent of geographic adjustments both in the rural and urban sections. Only through immediate action along lines of soil protection and rebuilding will the increasing number of erosion-scarred slopes, abandoned farmsteads, and fading villages be stopped. Similarly, the wind erosion problem which has caused marked alteration in land use in submarginal areas has also played a part in determining the nature of geographic adjustments.

Although the problems of the irrigation farmer are peculiar to that type of farming, he is, however, faced with the contral of water or wind erosion where soil structure has not been maintained. Rapid erosion of tributary watersheds is causing the water resources upon which the irrigated sections depend to become less and less each year. Perhaps the geographer is most concerned with this fact, and the rapid silting of numerous reservoirs which hold water that is the life-blood of these irrigated valleys. Here again problems of soil and water loss will determine, in a large measure, future geographic adjustments.

The stock raising industry of the Northwest has suffered severely from depleted pastures. Once luxuriant bunch grass ranges now present a dismal picture of sage and land. Range lands once noted for their carrying capacity no longer furnish abundant feed. Not only has the grass supply become depleted to a critical point, but the water supply has also been decreased because of rapid run-off. A program of restoration of these depleted lands together with proper use of yet productive ranges must be initiated to prevent further changes in the types of adjustment on range land areas.

The forest land picture must be looked at both from the standpoint of the improper cutting of the timber supply as well as from the standpoint of overgrazing of forest ranges. Improper utilization of vast forest resources have already resulted in land abandonment, barren slopes and ghost towns. Cultivated lands of the coastal valleys must be so managed that soil structure and fertility are maintained in order to increase their productivity or to maintain their present geographic pattern.

Highly productive lands of England and Germany have been cultivated for centuries while we in the Northwest have damaged thousands of acres of valuable land in 65 years. Our ruthless destruction of cultivated grazing or forested areas has had a profound effect upon changes in geographic adjustments of the future will be determined by present and future conservation of our soil and water resources.

New Maps of Temperature Anomaly

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A logical basis for maps of temperature anomaly has been given by the equation R. Spitaler derived for determining what the temperature of any given latitude would be if there were no circulation in the atmosphere. This equation, published in Der Beitrage zur Geophysik, 35:87-101, 1932, takes into account the radiation from the earth ndependent of insolation, the amount of insolation received, and the reaction of land and water surfaces to insolation, which, of course, must consider the amount of land or water surface on the parallel. The mean temperatures derived by this formula have been found to agree remarkably well with the observed means, and they permit the separation of means for land or water.

The maps presented were based on Spitaler's means for the extreme months. January and July were used for the land, and February and August were used for the oceans. The data were obtained from Schott for the oceans, from the Koppen-Geiger Handbuck for North America, Australia, and the Arctic regions, and from Gorczynski for Europe, Asia, Africa, and South America.

The maps show clearly the different parts the continents and the oceans play in the heat economy of the world. They show the role of the tropics as sources of heat, and the similar part the continents play in summer.

The Forest Situation in Western Washington

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The Puget Sound region and the coastal lowlands of Washington have depended, from their beginning history, more upon lumber and ofrest products than upon any other resource. After nearly three-quarters of a ecntury of intensive exploitation, lumbering is still the greatest industry of this area, leading by nearly double the value of the output of agriculture, the next industry in rank. In spite of the tremendous importance of forest products in the economic well-being of Western Washington, there is still no adequate program for safeguarding the basis of the industry. County after county is continuing to reduce its timber holdings with but feeble efforts at reforestation, until the management of timber lands for contiruous production is one of the most important economic projects needing attention in the Northwest today.

Numerous factors combine to make the Pacific Northwest one of the finest prospective sustained yield timber areas on the continent. Half of the remaining stand of virgin saw timber in the United States is still to be found here. Furthermore, a mild and humid climate, soils that are for the most part of a leached glacial gravel, and adverse topography, combine to render 90 percent of the cut-over land inhospitable toward agriculture while offering no deterrent to forest growth.

Although continuation of the present destructive policy may mean a serious depletion of timber resources within the next score of years, under sustained yield management, several schemes for which have been worked out on a practical basis, there need never be a curtailment in lumber operations. At the present time the annual drain on the forests of Washington is two-thirds more than the normal increase. Under conditions of crude forestry the growth may nearly equal the cut, and under intensive management, this region could actually be storing up a timber capital for the future.

Nevertheless it may be concluded that present timber resources in Western Washington are adequate for some time to come, and that the immediate need is not so much to create new timber assets, as to safeguard watersheds, control floods, and return to productivity otherwise wasted lands. Viewed from a long time angle, however, it seems evident that management of existing stands and reforestation of cut-over land classified as timber growing land, is essential if lumbering is to continue as a permanent industry.

Finally, one additional understanding seems essential—a realization that there is nothing sacred in virgin stands or even in the original dominant species. No finer lumber producing trees grow in in North America than native stands of Douglas fir. Second growth Douglas fir is an inferior lumber tree, however, and several other native trees including western hemlock and spruce, grow faster, produce higher yields per acre and better lumber in second growth than Douglas fir. It seems entirely

probable that Western Washington may shift over rather largely, as the Southern Pine Belt has done, from its original native forest to a faster growing species once considered inferior, but now recognized as of greater value than the original stands.

Regarding Washington's timber future, it seems safe to predict that unless sustained yield management becomes general almost immediately and unless restocking of rapid growing, high-yielding trees is made on cut-over lands within the next few years, another decade or two will see the national state leadership in lumber production shift from Washington, back to Louisiana, Georgia, or some other state in the Southern Pine Belt, where climatic conditions for rapid growth are the equal of those in the Northwest, but where topographic conditions for sustained yield reforestation are in many instances more favorable, where labor is cheaper, where markets are nearer, and where at least a ten year advantage of start in sustained yield policy will be eminent.

The Cut-Over Land Situation in Western Washington

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The first stage in American utilization of a forest region has been one of boom exploitation accompanied by the development of local towns and agricultural settlement. Once most of the virgin timber has been cut, there are three potential trends: permanent logging of second-growth timber on a sustained yield basis, agricultural or some other type of replacement, or general decline and abandonment of the area.

Western Washington is now entering this second stage. Approximately 55 per cent of the area of the 19 Western Washington counties is carried by the county assessors as privately owned. In 1910 45 per cent of this privately owned land was assessed as timber, in 1935 only 25 per cent. In the same period cleared land increased from 6 to but 8 per cent, and cut-over land from 45 to 65 per cent of the assessed land. In the past 15 years most of the counties appear to have reached approximate stability in the total cleared acreage assessed, or even a decline in some cases.

Agricultural occupation, therefore, is obviously not the trend in Western Washington, and no other industries have yet been developed sufficiently to replace logging in the regional economy. The choice lies between permanent logging, and general decline and partial abandonment. Some relict communities already exist. In many districts the second-growth timber is not now suitably distributed in age classes for sustained yield forest management. Unless Western Washington is to undergo a period of definite decline, it must pay careful attention to the regrowth of timber.

A Geographical Approach to the Social Studies

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The chief purpose of school administration is the improvement of the conduct of pupils. The social studies can be a very potent agency in improving the social competence of pupils particularly when the teacher makes understanding the highest aim of the course. The contribution made by the social studies to the general aim of education would be greater if the man to nature relationships received equal emphasis with the man to man relationships. Though the relation of the activities of a large urban agglomeration to geographical factors is more complicated and more difficult to distinguish, it is no less real than the relation of the activities of small rural groups to their natural environment.

The following outline adapted from Renner and White's "Geography: An Introduction to Human Ecology", gives a sweeping view of man's atcivities. An adaptation of it may be used as the approach to any social study.

A. Purpose:

1. To show the relation of the human activities of a given social study to the natural environment in order that pupils may have a more intelligent understanding of those activities and thus improve their conduct and social competence.

B. The Outline:

1. Statement of the aim of education
2. Needs of man
   a. Existence
   b. Cultural
3. Activities of man that have developed from his efforts to satisfy his needs and desires
   a. Economic
   b. Social
   c. Political
4. The natural environment, without which 1, 2, 3 (of outline) could not exist.
   a. Natural elements
      1. climate
      2. Soil
      3. relief
      4. minerals
      5. coast zone
      6. underground waters
      7. surface waters
   b. Organic elements
      1. native plant life
      2. native animal life
   c. Abstract elements
      1. Size and area
      2. location and acess

The outline emphasizes the relation of the geographical elements to man's activities and the general aim of education. Such an approach should make the social studies more intelligible to the student and therefore of more practical value to him in the understanding and solving of economic, social and political problems.

The Seamless Hosiery Industry of Laconia, New Hampshire

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The conditions and prospects for any definite economic endeavor within a region or city can be fully understood only by taking cognizance of the conditions and prospects of its competitors. The hosiery industry of Laconia, the seamless hosiery manufacturing center of New Hampshire, declined greatly during the last decade. A comparison of basis for the industry in Laconia and in the principal areas of American seamless hosiery production, the Chattanooga district and the North Carolina Piedmont, reveals the possibilities of Laconia.

There is inherent in the Laconia site neither major advantage nor impressive handicap for hosiery manufacturing. In the two large cost items of raw materials and labor it stands on a par with competitors. The New Hampshire center lacks, however, modern plants and automatic machinery For that reason it must, in-so-far as market demand does not permit expansion of plants, produce the higher quality and more specialized lines.

Advantages of Laconia that encourage industrial revival are its relative proximity to the marketing center, a position permitting frequent personal contacts between manufacturers and factors, and a reputation for high quality goods.

Its principal handicaps are the inefficiency of plants and equipment that commonly characterize old industrial regions, and a defeatist attitude—an attitude developed during that period when southern competing centers enjoyed decided labor cost advantages, and aggravated by style changes perplexing to long-established industrial centers.

The Massachusetts-Rhode Island Boundary as an Example of a State Line's Influence on the Occupance Pattern of an Area

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A state boundary line does have an influence on the occupance pattern; it is a cultural impress, almost obliterated in some areas but very evident in others: with the exception of regular boundary markers, most of the rural parts of the eastern Rhode Island—Massachusetts line are not marked by even fence or property lines. In more thickly settled industrial and urban outskirt areas, however, the line is very definitely marked by such items as: road endings and surface changes reflecting differences in administration, location of factories, as well as minor vice establishments (to avoid stricter laws or higher taxes of a neighboring state) and by changes and termini of water, sewer, electricity, and other utilities which in turn influence the location of some settlement forms. Other problems of

geographic interest are present such as the protection of city water supplies derived from interstate watersheds.

Few of the adaptions, however, are direct and clear cut. This leads to the conclusion, borne out by numerous further examples, that a state line is apt to exert its influence over a zone and not in a sharp line of demarcation or cleavage. Examples illustrating this tendency are: extensions of utilities and roads for short distances over the state line and the presence of slums and minor vice areas on both sides of the line although the reason for their existence originated in the less strict laws and lower taxes of one side.

This zonal quality apparently reflects in some measure the compromise between the fixed political, and the actual changing areal limits of expanding and contracting human activities. It also seems to be a major factor differentiating a state line from an international boundary.

The Rise and Decline of the Indigo Industry of South Carolina

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Indigo production in the middle coastal plain region of South Carolina began in 1741 and flourished for a little more than a century. The rapid rise to favor and the almost equally rapid decline in production were the result of several physical, human, and economic factors.

Favoring factors in the development of the industry included:

1. Extensive areas of well drained upland sandy loam soils
2. Favorable climatic conditions, including abundant well distributed rainfall, and a long growing season
3. Nearby marl deposits which provided lime, used in the process of extracting the dye
4. A good supply of cheap slave labor which had been introduced earlier into the region to cultivate the rice lands along the streams
5. The high price which indigo commanded in the British market fitted it for this pioneer region, where a product of high value and small bulk was needed
6. The bounty on indigo established by Parliment to apply throughout the Empire.

The decline in production which set in after the Revolutionary War ended in the virtual extinction of the industry shortly after the middle of the nineteenth century. The following factors contributed to the decline:

1. The loss of the English bounty after the Revolution
2. Destruction of the crop due to ravages of grasshoppers
3. Competition from new regions of production in the East Indies
4. The obnoxiousness of the odoriferous vats which were used in the process of extracting the dye
5. The increased importance of cotton production after the invention of the cotton gin
6. The introduction of artificial dyes developed from coal tar.